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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : C11D 1/835, 3/22, 3/30, 3/32, 3/37, 10/02 — A1

(11) Internati nal Publication Number: **WO 97/42281**

(43) International Publication Date: 13 November 1997 (13.11.97)

(21) International Application Number: PCT/US97/06179

(22) International Filing Date: 24 April 1997 (24.04.97)

(30) Priority Data:
08/646,176 7 May 1996 (07.05.96) US

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(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: SUGAR SURFACTANTS COMBINED WITH SPECIFIC POLYQUATERNIUM COMPONENT

(57) Abstract

A surfactant composition containing: (a) a nonionic sugar surfactant selected from the group consisting of alkyl glucose esters, aldobionamides, gluconamides, glyceramides, glyceroglycolipids, polyhydroxy fatty acid amides, alkyl polyglycosides having general formula (I): $R_1O(R_2O)_b(Z)_a$ wherein R_1 is a monovalent organic radical having from about 6 to about 30 carbon atoms; R_2 is divalent alkylene radical having from 2 to 4 carbon atoms; Z is a saccharide residue having 5 or 6 carbons atoms; b is a number having a value from 0 to about 12; a is a number having a value from 1 to about 6, and mixtures thereof; and (b) an additive consisting of a copolymer of acrylamide and dimethyl diallyl ammonium chloride.

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SUGAR SURFACTANTS COMBINED WITH SPECIFIC POLYQUATERNIUM COMPONENT

Field of the Invention

The present invention relates to a composition and process for enhancing the tactile and aesthetic properties of sugar surfactants. More particularly, by adding an effective amount of a polyquaternium component to a sugar surfactant, the tactile properties of the sugar surfactant are significantly enhanced.

Background of the Invention

Sugar surfactants such as, for example, alkyl polyglycosides or fatty acid-N-alkyl glucamides, are distinguished from other surfactants by their excellent detergent properties and high ecotoxicological compatibility. For this reason, these classes of nonionic surfactants are acquiring increasing significance. They are generally used in liquid formulations, for example dishwashing detergents and hair shampoos.

While conventional sugar surfactants perform satisfactorily in many applications, there is a constant need to both enhance and expand their performance properties. Methods of improving the performance of conventional sugar surfactants by increasing their: foaming and foam stability, tolerance to water hardness and detergency, continue to be sought.

A specific problem associated with sugar surfactants, however, relates to the undesirable tactile properties which they impart onto both skin and hair upon contact with the human body, commonly referred to in the industry by the term "scroopiness". More particularly, sugar surfactants such as alkyl polyglycosides, when applied onto hair and/or skin tend to make it feel rough, dry and sticky as if hairspray were applied thereon. However, due to their nonionic character, synergistic relationship with other surfactants, tendency towards high foaming and mildness with respect to skin irritation, sugar surfactants have become highly desirable surfactants for use in the personal care products industry.

Thus, it is a primary object of this invention to provide a means for enhancing the tactile properties of sugar surfactants, thereby making their use more acceptable in the personal care products industry.

Summary of the Invention:

The present invention is thus directed to a surfactant composition containing:

(a) a sugar surfactant selected from the group consisting of alkyl glucose esters, aldobionamids, gluconamides, glyceramids, glyceroglycolipids,

polyhydroxy fatty acid amides, alkyl polyglycosides having the general formula I:

$$R_1O(R_2O)_b(Z)_a \qquad I$$

wherein R_1 is a monovalent organic radical having from about 6 to about 30 carbon atoms; R_2 is divalent alkylene radical having from 2 to 4 carbon atoms; Z is a saccharide residue having 5 or 6 carbon atoms; b is a number having a value from 0 to about 12; a is a number having a value from 1 to about 6, and mixtures thereof; and

(b) an additive consisting of a copolymer of acrylamide and dimethyl diallyl ammonium chloride.

The present invention also provides a process for improving the tactile properties of a sugar surfactant involving adding an effective amount of the above-disclosed additive to a nonionic sugar surfactant selected from the group consisting of alkyl glucose esters, aldobionamides, gluconamides, glyceramides, glyceroglycolipids, polyhydroxy fatty acid amides, alkyl polyglycosides of formula I, and mixtures thereof.

The present invention also provides a cleansing composition for treating keratinous substrates, the composition containing:

(a) from about 2 to about 15% by weight of the above-disclosed surfactant composition; and

(b) remainder water.

Description of the Invention:

Other than in the operating examples, or where otherwise indicated, all

number expr ssing quantiti s of ingredients or reaction conditions used herein are to b understood as being modified in all instances by the term "about".

The term nonionic sugar surfactant as used herein refers to surfactants that are based on saccharide moieties. The nonionic sugar surfactants which may be employed in the present invention are selected from the group consisting of alkyl polyglycosides, alkyl glucose esters, aldobionamides, gluconamides, glyceramides, glyceroglycolipids, polyhydroxy fatty acid amides, and mixtures thereof.

Preferred alkyl polyglycosides which can be used as the complexing agent in the concentrate of the invention have the formula I:

$$R_1O(R_2O)_b(Z)_a \qquad I$$

wherein Z is a glucose residue and b is zero. Such alkyl polyglycosides are commercially available, for example, as GLUCOPON®, or PLANTAREN® surfactants from Henkel Corporation, Ambler, PA., 19002. Examples of such surfactants include but are not limited to:

1. GLUCOPON® 225 Surfactant - an alkyl polyglycoside in which the alkyl group contains 8 to 10 carbon atoms and having an average degree of polymerization of 1.7.

2. GLUCOPON® 425 Surfactant - an alkyl polyglycoside in which the alkyl group contains 8 to 16 carbon atoms and having an average degree of polymerization of 1.6.

3. GLUCOPON® 625 Surfactant - an alkyl polyglycoside in which the alkyl groups contains 12 to 16 carbon atoms and having an average degre of polymerization of 1.6.

4. APG® 325 Surfactant - an alkyl polyglycoside in which the alkyl groups contains 9 to 11 carbon atoms and having an average degree of polym rization of 1.6.

5. GLUCOPON® 600 Surfactant - an alkyl polyglycoside in which the alkyl groups contains 12 to 16 carbon atoms and having an average degree of polymerization of 1.4.

6. PLANTAREN® 2000 Surfactant - a C_{8-16} alkyl polyglycoside in which the alkyl group contains 8 to 16 carbon atoms and having an average degree of polymerization of 1.4.

7. PLANTAREN® 1300 Surfactant - a C_{12-16} alkyl polyglycoside in which the alkyl groups contains 12 to 16 carbon atoms and having an average degree of polymerization of 1.6.

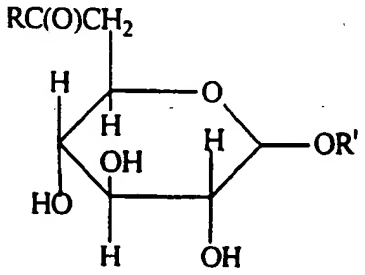
Other examples include alkyl polyglycoside surfactant compositions which are comprised of mixtures of compounds of formula I wherein Z represents a moiety derived from a reducing saccharide containing 5 or 6 carbon atoms; a is a number having a value from 1 to about 6; b is zero; and R_1 is an alkyl radical having from 8 to 20 carbon atoms. The compositions are characterized in that they have increased surfactant properties and an HLB in the range of about 10 to about 16 and a non-Flory distribution of glycosides, which is comprised of a mixture of an alkyl monoglycoside and a mixture of alkyl polyglycosides having varying degrees of polymerization of 2 and higher in progressively decreasing amounts, in which the amount by weight of polyglycoside having a degree of polymerization of 2, or mixtures thereof with the polyglycoside having a degree of polymerization of 3, predominate in relation to the amount of monoglycoside,

said composition having an av rag degre of polym rization of about 1.8 to about 3. Such compositions, also known as peaked alkyl polyglycosides, can be prepared by separation of the monoglycoside from the original reaction mixture of alkyl monoglycoside and alkyl polyglycosides after removal of the alcohol. This separation may be carried out by molecular distillation and normally results in the removal of about 70-95% by weight of the alkyl monoglycosides. After removal of the alkyl monoglycosides, the relative distribution of the various components, mono- and poly-glycosides, in the resulting product changes and the concentration in the product of the polyglycosides relative to the monoglycoside increases as well as the concentration of individual polyglycosides to the total, i.e. DP2 and DP3 fractions in relation to the sum of all DP fractions. Such compositions are disclosed in U.S. patent 5,266,690, the entire contents of which are incorporated herein by reference.

Other alkyl polyglycosides which can be used in the compositions according to the invention are those in which the alkyl moiety contains from 6 to 18 carbon atoms in which and the average carbon chain length of the composition is from about 9 to about 14 comprising a mixture of two or more of at least binary components of alkylpolyglycosides, wherein each binary component is present in the mixture in relation to its average carbon chain length in an amount effective to provide the surfactant composition with the average carbon chain length of about 9 to about 14 and wherein at least one, or both binary components, comprise a Flory distribution of polyglycosides derived from an acid-catalyzed reaction of an alcohol containing 6-20 carbon atoms and a suitable saccharide from which excess alcohol has been separated. The alkyl

polyglycosid of the pr sent inv ntion acts as the complexing agent for the iodine complex concentrate.

The alkyl glucose ester sugar surfactants are generally disclosed in U.S. patent Nos. 5,109,127 and 5,190,747 the entire contents of both of which are incorporated herein by reference. These sugar surfactants have the general formula II:

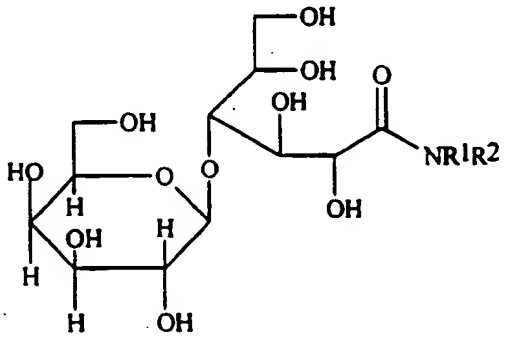


wherein R represents a fatty acid residue of 6 to 20 carbon atoms, preferably 6 to 12 carbon atoms and R^1 represents an alkyl group having 2 to 6 carbon atoms. Representative examples of such alkyl glucose esters are 1-ethyl-6-caprylglucoside, 1-ethyl-6-laurylglucoside, 1-butyl-6-caprylglucoside, 1-ethyl-6-palmitylglucoside and 1-ethyl-6-oleylglucoside.

The aldobionamide sugar surfactants are generally disclosed in U.S. Patent No. 5,310,542 and in published European Patent Application No. 550,281 both of which are incorporated herein by reference. An Aldobionamide is generally defined as the amide of an aldobionic acid or aldobionolactone and an aldobionic acid in turn is defined as a sugar substance (e.g. any cyclic sugar) in which the aldehyde group has be n replaced by a carboxylic acid which upon

drying is capable of cyclizing to form an aldonolactone. The aldobionamides can be based on compounds comprising two saccharide units, e.g. lactobionamides, maltobionamides, cellobiónamides, melibionamides, or gentiobionamides, or they can be based on compounds comprising more than two saccharide units provided that the polysaccharide has a terminal sugar unit with an aldehyde group available.

The preferred aldobionamides of the present invention are lactobionamides of the formula III:



wherein R^1 and R^2 are the same or different and are selected from hydrogen and an aliphatic hydrocarbon radical containing up to about 36 carbon atoms (e.g. alkyl groups and alkenyl groups which groups may also include a heteroatom such as N, O, S, present, for instance, as an amide, carboxy, ether and/or saccharide moiety) except that R^1 and R^2 cannot simultaneously be hydrogen. The aliphatic hydrocarbon radical preferably contains up to 24 carbon atoms, most preferably from 8 to 18 carbon atoms. Representative examples of such lactobionamides are N-propyl lactobionamid , N-pentyl lactobionamide, N-decyl

lactobionamid , N-h xadecyl lactobionamid , N-oleyl lactobionamide, N-dodecyl-N-methyl lactobionamide, and N-dodecyloxypropyl lactobionamide.

The gluconamide sugar surfactants are generally disclosed in U.S. Patent 5,352,386 the entire contents of which is incorporated herein by reference. These surfactants have the general formula IV:

$$HOCH_2\text{-}(CHOH)_m\text{-}C(O)\text{-}NHR$$

wherein m is an integer from 2 to 5; and R is a straight or branched, saturated or unsaturated aliphatic hydrocarbon having 4 to about 24 carbon atoms, preferably 8 to 24 carbon atoms, which R group can also contain a heteroatom selected from the group consisting of oxygen, nitrogen and sulfur. Representative examples of such cosurfactants are N-octylerythronamide, N-decylerythronamide, N-dodecylerythronamide, N-tetradecylerythronamide, N-decylxylonamide and N-dodecylxylonamide.

The glyceramide sugar surfactants are generally disclosed in U.S. Patent 5,352,387 the entire contents of which is incorporated herein by reference. These cosurfactants have the general formula V:

$$HOCH_2CH(OH)C(O)NHR$$

wherein R is a C_8 to C_{24} straight or branched chained, saturated or unsaturated aliphatic hydrocarbon in which the R group may also be substituted by a

heteroatom selected from oxygen, nitrogen and sulfur. Representativ exampl s of such cosurfactants ar N-octylglyceramide, N-decylglyceramid and N-hexadecylglyceramide.

The glyceroglycolipid sugar surfactants are generally disclosed in U.S. Patent 5,358,656, and published European Patent Application No. 550,279 the disclosure of each of which is incorporated herein by reference. The glyceroglycolipids can be of the formula VI:

$$A^1\text{-}O\text{-}CH_2\text{-}CH(B)\text{-}CH_2NRR_1$$

wherein A^1 is a saccharide, preferably having one or more saccharide units, more preferably a mono or disaccharide and most preferably a monosaccharide such as glucose or galactose; R and R_1 are the same or different and are hydrogen, a branched or unbranched hydrocarbon radical having from 1 to about 24, preferably from about 6 to about 18 carbon atoms; B is OH or a NR^2R^3 group, wherein R^2 and R^3 may be the same or different and are hydrogen, a branched or unbranched hydrocarbon radical having 1 to 24, preferably from 6 to 18 carbon atoms, and NRR_1 and B are positionally interchangeable. Representative examples of such cosurfactants are 3-(butylamino)-2-hydroxypropyl-β-D-galactopyranoside, 3-(octylamino)-2-hydroxypropyl-β-D-galactopyranoside, 3-(eicosylamino)-2-hydroxypropyl-β-D-galactopyranoside, 3-(butylamino)-2-hydroxypropyl-β-D-glucopyranoside, and 3-(pentylamino)-2-hydroxypropyl-β-D-mannopyranoside.

Other glyceroglycolipid surfactants are disclosed in published European Patent Application No. 550,280 which is incorporated herein by reference. These cosurfactants are of the formula VII:

$$A^1\text{-}O\text{-}CH_2\text{-}CH(OR_1)\text{-}CH_2OR$$

wherein A^1 is from 1 to 4 saccharide units and more preferably represents a mono or disaccharide, and most preferably a monosaccharide, for example, glucose or galactose; R and R_1 are the same or different and are hydrogen, or a branched or unbranched, saturated or unsaturated, hydrocarbon radical having from 1 to 24 carbon atoms, preferably from 6 to 18 carbon atoms. Representative examples of such cosurfactants are 3-(butyloxy)-2-hydroxypropyl-β-D-galactopyranoside, 3-(eicosyloxy)-2-hydroxypropyl-β-D-galactopyranoside, 3-(decyloxy)-2-hydroxypropyl-β-D-galactopyranoside, 3-(butyloxy)-2-hydroxypropyl-β-D-glucopyranoside,3-(octyloxy)-2-hydroxypropyl-β-D-mannopyranoside, 3-(tetradecyloxy)-2-hydroxypropyl-β-D-lactoside, 3-(octadecyloxy)-2-hydroxypropyl-β-D-maltoside,3-(octyloxy)-2-hydroxypropyl-β-D-galactotrioside, and 3-(dodecyloxy)-2-hydroxypropyl-β-D-cellotrioside.

The polyhydroxy fatty acid amide sugar surfactants are generally disclosed in U.S. Patent Nos. 5,174,927, 5,223,179 and 5,332,528 the entire disclosure of each of which is incorporated herein by reference. The polyhydroxy fatty acid amide surfactant component of the present invention comprises compounds of the structural formula VIII:

$R^2C(O)N(R^1)Z$

wherein: R^1 is H, C_1-C_4 hydrocarbyl, 2-hydroxy ethyl, 2-hydroxy propyl or a mixture thereof, preferably C_1-C_4 alkyl, more preferably C_1 or C_2 alkyl, most preferably C_1 alkyl (i.e., methyl); and R^2 is a C_5-C_{31} hydrocarbyl, preferably straight chain C_7-C_{19} alkyl or alkenyl, more preferably straight chain C_9-C_{17} alkyl or alkenyl, most preferably straight chain C_{11}-C_{17} alkyl or alkenyl, or mixture thereof; and Z is a polyhydroxyhydrocarbyl having a linear hydrocarbyl chain with at least 3 hydroxyls directly connected to the chain, or an alkoxylated derivative (preferably ethoxylated or propoxylated) thereof. Z preferably will be derived from a reducing sugar in a reductive amination reaction; more preferably Z is a glycityl. Suitable reducing sugars include glucose, fructose, maltose, lactose, galactose, mannose, and xylose. As raw materials, high dextrose corn syrup, high fructose corn syrup, and high maltose corn syrup can be utilized as well as the individual sugars listed above. These corn syrups may yield a mix of sugar components for Z. It should be understood that it is by no means intended to exclude other suitable raw materials. Z preferably will be selected from the group consisting of $-CH_2-(CHOH)n-CH_2OH$, $-CH(CH_2OH)-(CHOH)_{n-1}-CH_2OH$, $-CH_2-(CHOH)_2(CHOR')(CHOH)-CH_2OH$, where n is an integer from 3 to 5, inclusive, and R' is H or a cyclic or aliphatic monosaccharide, and alkoxylated derivatives thereof. Most preferred are glycityls wherein n is 4, particularly $-CH_2-(CHOH)_4-CH_2OH$.

In the above Formula R^1 can be, for example, N-methyl, N-ethyl, N-propyl,

N-isopropyl, N-butyl, N-2-hydroxy ethyl, or N-2-hydroxy propyl.

$R^2C(O)N<$ can be, for example, cocamide, stearamide, oleamide, lauramide, myristamide; capricamide, palmitamide, tallowamide, etc.

Z can be 1-deoxyglucityl, 2-deoxyfructityl, 1-deoxymaltityl, 1-deoxylactityl, 1-deoxygalactityl, 1-deoxymannityl, 1-deoxymaltotriotityl, etc.

Representative examples of such surfactants are N-methyl-N-1-deoxyglucityl cocoamide and N-methyl-N-1-deoxyglucityl tallowamide.

Other suitable polyhydroxy fatty acid amide surfactants (see U.S. Patent Nos. 5,223,179 and 5,338,491, the entire contents of each which are incorporated herein by reference) are those of the formula IX:

$$RC(O)N(R^1)CH_2CH(OH)CH_2OH$$

wherein R is a C_7-C_{21} hydrocarbyl species, i.e. coconut, tallow, palm fatty alkyl and oleyl, and R^1 is a C_1 to C_6 hydrocarbyl or substituted hydrocarbyl species, i.e. N-alkyl-N-(1,2-propanediol) and N-hydroxyalkyl-N-1,2-propane diol fatty acid amides. Representative examples of such cosurfactants are the tallow amide of 3-[2-(hydroxyethyl)amino]-1,2-propanediol (HEAPD), the palmitate amide of 3-methylamino-1,2-propanediol (MAPD) and the lauramide of MAPD.

The additive of the present invention is used to improve the tactile properties of the above-disclosed nonionic sugar surfactants.

The additive of the present invention is a copolymer of acrylamide and dimethyl diallyl ammonium chloride having a mol cular weight ranging from

about 400,000 to about 600,000, and preferably from about 500,000 to about 550,000. An xampl of a preferred additive is MERQUAT® 550, a copolymer of acrylamide and dimethyl diallyl ammonium chloride having a molecular weight of about 550,000, commercially available from Merck, Inc.

In one embodiment of the present invention there is provided a surfactant composition having enhanced tactile properties. The surfactant composition contains a combination of at least one of the above-disclosed nonionic sugar surfactants and the additive of formula II. The surfactant composition preferably contains from about 92 to about 99% by weight, and most preferably from about 95.0 to about 97.0% by weight of a nonionic sugar surfactant, and from about 1 to about 8% by weight, and most preferably from about 3.0% to about 5.0% by weight of the additive, all weights being based on the weight of the surfactant composition.

The nonionic sugar surfactant is preferably an alkyl polyglycoside of formula I wherein R_1 is a monovalent organic radical having from about 8 to about 16 carbon atoms, b is zero, and a is a number having a value of from about 1 to about 2.

According to another aspect of the invention, there is provided a process for enhancing the tactile properties of a nonionic sugar surfactant involving adding thereto an effective amount of the additive of formula II. The process involves combining the nonionic sugar surfactant and additive in the above-disclosed proportions, by conventional mixing means.

Th present invention also provides a cleansing composition for treating

keratinous substrates such as human hair having improved tactile properties. The cleansing composition of the present inv ntion preferably contains from about 2 to about 15% by weight, and most preferably from about 6 to about 12% by weight of the above-disclosed surfactant composition, with the remainder water, all weights being based on the weight of the cleansing composition. Additional ingredients such as, for example: C_{8-22} alkyl sulfates and their salts which may be ethoxylated with from 1-50 moles of (EO), cocoamides, their salts and derivatives thereof, along with citric acid, its salts and derivatives, may also be contained in the cleansing composition, without departing from the spirit of the invention.

The practice of this invention may be further appreciated by consideration of the following non-limiting, working examples, and the benefits of the invention may be further appreciated by reference to the comparison examples.

TACTILE IMPROVEMENT:

Composition A

A surfactant composition was prepared by combining 97% by weight of an alkylpolyglycoside, specifically, PLANTAREN® 2000 with 3% by weight of a copolymer of acrylamide and dimethyl diallyl ammonium chloride, specifically, MERQUAT® 550.

The following shampoo formulations were prepared in order to determine the tactile properties imparted by a surfactant composition of the present invention versus that of a control group.

EXAMPLE 1

COMPONENT	% by weight
STANDAPOL® ES-2	15.0
STANDAMID® SD	3.0
Composition A	15.0
thickener	0.5
Citric acid soln., pH to 6.5	2.0
water	64.5
	100.0

STANDAPOL® ES-2 is ammonium laureth sulfate having a degree of ethoxylation of about 2, available from Henkel Corp., Emery Division.

STANDAMID® SD is cocamide DEA, available from Henkel Corp., Emery Division.

COMPARISON EXAMPLE 1

COMPONENT	% by weight
STANDAPOL® ES-2	15.0
STANDAMID® SD	3.0
PLANTAREN®-2000	15.0
thickener	0.5
Citric acid soln., pH to 6.5	2.0
water	64.5
	100.0

Test Procedure:

Example 1 and Comparison Example 1 were used to wash human hair and then evaluated for the feel they imparted on the hair after washing. The results showed that those individuals using the hair shampoo containing the surfactant composition of the present invention found their hair to be soft and supple after washing. Conversely, those washing with Comparison Example 1 found that their hair felt very dry and tacky immediately following the washing. Thus, it can be seen that by incorporating the alkyl polyglycoside composition of the present invention into personal care products, the resultant tactile properties are significantly enhanced.

It should be noted, however, that in a process for cleansing human hair and/or skin, the amount of additive will vary, depending on the particular type of cl ansing formulation being employed.

It will be recognized by thos skilled in the art that changes may be made to the above-described embodiments of the invention without departing from the broad inventive concepts thereof. It is understood, therefore, that this invention is not limited to the particular embodiments disclosed, but is intended to cover all modifications which are within the scope and spirit of the invention as defined by the appended claims.

What is claimed is:

1. A surfactant composition comprising:

(a) a nonionic sugar surfactant selected from the group consisting of alkyl glucose esters, aldobionamides, gluconamides, glyceramides, glyceroglycolipids, polyhydroxy fatty acid amides, alkyl polyglycosides having the general formula I:

$$R_1O(R_2O)_b(Z)_a \qquad I$$

wherein R_1 is a monovalent organic radical having from about 6 to about 30 carbon atoms; R_2 is divalent alkylene radical having from 2 to 4 carbon atoms; Z is a saccharide residue having 5 or 6 carbon atoms; b is a number having a value from 0 to about 12; a is a number having a value from 1 to about 6, and mixtures thereof; and

(b) an additive consisting of a copolymer of acrylamide and dimethyl diallyl ammonium chloride.

2. The composition of claim 1 wherein the nonionic sugar surfactant is an alkyl polyglycoside of formula I.

3. The composition of claim 2 wherein in formula I R_1 is a monovalent organic radical having from about 8 to about 16 carbon atoms, b is zero, and a is a number having a value from about 1 to about 2.

4. The composition of claim 1 wherein the nonionic sugar surfactant is present in the composition in an amount of from about 92 to about 99% by weight, based on the weight of the composition.

5. The composition of claim 4 wher in th nonionic sugar surfactant is

present in the composition in an amount of from about 95 to about 97% by weight, based on the weight of the composition.

6. The composition of claim 1 wherein the additive has a molecular weight ranging from about 400,000 to about 600,000.

7. The composition of claim 1 wherein the additive is present in the composition in an amount of from about 1 to about 8% by weight, based on the weight of the composition.

8. The composition of claim 7 wherein the additive is present in the composition in an amount of from about 2 to about 5% by weight, based on the weight of the composition.

9. The composition of claim 1 wherein the nonionic sugar surfactant is a polyhydroxy fatty acid amide.

10. The composition of claim 6 wherein the additive has a molecular weight ranging from about 500,000 to about 550,000.

11. A process for enhancing the tactile properties of a nonionic sugar surfactant comprising:

(a) providing a nonionic sugar surfactant selected from the group consisting of alkyl glucose esters, aldobionamides, gluconamides, glyceramides, glyceroglycolipids, polyhydroxy fatty acid amides, alkyl polyglycosides having general formula I:

$$R_1O(R_2O)_b(Z)_a \qquad I$$

wherein R_1 is a monovalent organic radical having from about 6 to about 30 carbon atoms; R_2 is divalent alkylene radical having from 2 to 4 carbon atoms;

Z is a saccharide residue having 5 or 6 carbon atoms; b is a number having a value from 0 to about 12; a is a number having a value from 1 to about 6, and mixtures thereof;

(b) providing an additive consisting of a copolymer of acrylamide and dimethyl diallyl ammonium chloride; and

(c) mixing components (a) and (b) to form a surfactant blend.

12. The process of claim 11 wherein the nonionic sugar surfactant is an alkyl polyglycoside of formula I.

13. The process of claim 12 wherein in formula I R_1 is a monovalent organic radical having from about 8 to about 16 carbon atoms, b is zero, and a is a number having a value from about 1 to about 2.

14. The process of claim 11 wherein the nonionic sugar surfactant is present in the surfactant blend in an amount of from about 92 to about 99% by weight, based on the weight of the blend.

15. The process of claim 14 wherein the nonionic sugar surfactant is present in the composition in an amount of from about 95 to about 97% by weight, based on the weight of the blend.

16. The process of claim 11 wherein the additive has a molecular weight ranging from about 400,000 to about 600,000.

17. The process of claim 11 wherein the additive is present in the surfactant blend in an amount of from about 1 to about 8% by weight, based on the weight of the blend.

18. Th process of claim 17 wh rein the additiv is present in the surfactant

blend in an amount of from about 2 to about 5% by weight, based on the weight of the blend.

19. The process of claim 11 wherein the nonionic sugar surfactant is a polyhydroxy fatty acid amide.

20. The process of claim 16 wherein the additive has a molecular weight ranging from about 500,000 to about 550,000.

21. A cleansing composition comprising:

(a) from about 2 to about 15% by weight, based on the weight of the composition, of a surfactant blend, the surfactant blend containing:

(i) a nonionic sugar surfactant selected from the group consisting of alkyl glucose esters, aldobionamides, gluconamides, glyceramides, glyceroglycolipids, polyhydroxy fatty acid amides, alkyl polyglycosides having the general formula I:

$$R_1O(R_2O)_b(Z)_a \qquad I$$

wherein R_1 is a monovalent organic radical having from about 6 to about 30 carbon atoms; R_2 is divalent alkylene radical having from 2 to 4 carbon atoms; Z is a saccharide residue having 5 or 6 carbon atoms; b is a number having a value from 0 to about 12; a is a number having a value from 1 to about 6, and mixtures thereof; and

(ii) an additive consisting of a copolymer of acrylamide and dimethyl diallyl ammonium chloride; and

(b) r mainder water.

22. Th composition of claim 21 wherein the nonionic sugar surfactant is an

alkyl polyglycoside.

23. The composition of claim 22 wherein in formula I R_1 is a monovalent organic radical having from about 8 to about 16 carbon atoms, b is zero, and a is a number having a value from about 1 to about 2.

24. The composition of claim 21 wherein the nonionic sugar surfactant is present in the blend in an amount of from about 92 to about 99% by weight, based on the weight of the blend.

25. The composition of claim 24 wherein the nonionic sugar surfactant is present in the blend in an amount of from about 95 to about 97% by weight, based on the weight of the blend.

26. The composition of claim 21 wherein the additive has a molecular weight ranging from about 400,000 to about 600,000.

27. The composition of claim 21 wherein the additive is present in the blend in an amount of from about 1 to about 8% by weight, based on the weight of the blend.

28. The composition of claim 27 wherein the additive is present in the blend in an amount of from about 2 to about 5% by weight, based on the weight of the blend.

29. The composition of claim 21 wherein the nonionic sugar surfactant is a polyhydroxy fatty acid amide.

30. The composition of claim 26 wherein the additive has a molecular weight ranging from about 500,000 to about 550,000.

31. The composition of claim 21 further containing a component selected from

the group consisting of C_{8-22} alkyl sulfates and their salts, ethoxylated C_{8-22} alkyl sulfates and their salts, cocoamides, their salts and derivatives thereof, citric acid, its salts and derivatives, and mixtures thereof.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/06179

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :C11D 1/835, 3/22, 3/30, 3/32, 3/37, 10/02.
US CL :510/121, 123, 124, 126, 470-472, 501, 502, 504, 535-537.
According to International Patent Classification (IPC) r to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 510/121, 123, 124, 126, 470-472, 501, 502, 504, 535-537.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,057,311 A (KAMEGAI et al) 15 October 1991; col. 2, ll. 43-48; col. 7, ll. 24-27, 52-57; Table 1: Inventive Product 3 & Comparative Product 1 (col. 8); Example 4 (col. 9); Example 8 (col. 11).	1-8, 10-18, 20-28, 30 & 31
X	US 5,234,618 A (KAMEGAI et al) 10 August 1993, Example 4 (col. 8).	1, 6, 9-11, 16, 19, 20, 21, 26 & 29-31

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 MAY 1997	24 JUL 1997

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Form PCT/ISA/210 (second sheet)(July 1992)*

B. FIELDS SEARCHED
Electronic data bases consulted (Name of data base and where practicable terms used):

APS, CAS ONLINE:
search terms: merquat, 550, merquat550, polyquaternium, 7, polyquaternium7, quaternium, 41, quaternium41, apg?, ?glicoside?, ?saccharide?